Oral Sessions
From microcirculation to tissue perfusion: 0792–0796

0792

IMPROVING IMAGE ACQUISITION FOR SIDESTREAM DARKFIELD IMAGING OF THE MICROCIRCULATION BY A DISTANCING IMMOBILIZING DEVICE

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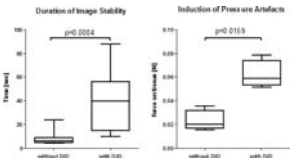
INTRODUCTION. Sidestream darkfield imaging (SDF) is widely used for investigating the microcirculation in critically ill patients. Maintaining image stability and avoiding pressure artifacts (PA) are the major operational issues in SDF. However, a significant amount of recordings are not suitable for analysis when reviewed in the post-processing, even when they had been acquired by trained operators.

OBJECTIVES. The aim of the study was to investigate the effects of the DID on the induction of PA, the alteration of flow patterns and the duration of imaging the sublingual microcirculation with SDF.

METHOD. Five healthy, awake volunteers were examined by four experienced operators. Through a redesigned stainless steel distancing immobilizing device (DID) [1], consisting of a hollow ring with 20 concave outlets mounted on SDF disposables and exceeding them by 100 μm, suction can be applied to the tissue. The force required to cause slowed or stopped flow of venules, thus inducing PA, was measured by gradually lowering a SDF imaging unit hanging on a spring balance. The time to acquire a stable image, the duration of pressure artifact-free stable image (x/y axis-translation < 40 μm) and influence on flow patterns of the imaged vessels were assessed with AVA 3.0 (Microvision Medical, Amsterdam, The Netherlands). Flow patterns were assessed by switching the suction on and off.

RESULTS. PA were induced at a significant higher force with DID 0.063 N (SD 0.01) versus no DID 0.023 N (SD 0.01) ($P = 0.016$). Flow was found not to be different with the suction turned on in small (on 328 vs. off 304 μm/s; $P = 0.23$), medium (283 vs. 291 μm/s; $P = 0.84$) and large vessels (311 vs. 366 μm/s; $P = 0.38$). The time required until the SDF image was stable amounted to 98.7 s (SD 62.7) without and 150.4 s (SD 82) with DID ($P = 0.124$). SDF image was kept stable for 7.96 s (SD 5.9) without and 41.56 s (SD 27.4) with DID ($P < 0.001$).



CONCLUSION. When imaging with DID higher pressures on the tissue are tolerated before PA are induced. Furthermore longer image stability is achieved. Both facts provide not only increased yield of analyzable images but also the opportunity for longitudinal observation on one specific area of the microcirculation during intervention studies.

REFERENCE. 1. Lindert J, Werner J, Redlin M et al. (2002) OPS imaging of human microcirculation: a short technical report. J Vasc Res 39:368–372.

GRANT ACKNOWLEDGEMENT. None.

0793

IS THERE A CORRELATION BETWEEN NEAR INFRARED SPECTROSCOPY AND SIDE DARK FIELD IMAGING?

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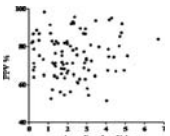
BACKGROUND. A growing body of evidence suggests implication of microcirculatory dysfunction in numerous diseases. The use of sidedark field (SDF) imaging and near infrared spectroscopy (NIRS) associated with a vascular occlusion test (VOT) have been proposed to assess microcirculation at the bedside. In sepsis, alterations in both types of measures are associated with a poor outcome [1, 2]. However these techniques may provide different information: SDF provides a direct look of the microvascular network whereas VOT gives more dynamic informations. We evaluated whether data obtained simultaneously with NIRS and SDF imaging in critically ill patients may be related.

MATERIALS AND METHODS. For NIRS (Inspectra, Hutchinson Technology, Hutchinson, MN, USA) we performed a 3 min VOT using a tourniquet, and we recorded: descending slope of StO2, ascending slope, StO2 at baseline and at its maximal value after the tourniquet release. To visualize the microcirculation in the sublingual area we used a SDF imaging device (MicroScan; MicroVision Medical, Amsterdam, The The Netherlands) with emphasis on the FCD calculated as the number of small vessels (< 20 μm) crossing lines of the grid divided by the total length of the grid and the proportion of small vessels perfused (PPV). Linear correlation was used.

RESULTS. We analyzed a total of 95 concomitant measures of NIRS and SDF in 51 patients (41 with severe sepsis or septic shock). We found no significant correlation between basal StO2 and FCD ($r^2 = 0.01$, $P = 0.44$) or PPV ($r^2 = 0.02$, $P = 0.11$), StO2 max and FCD ($r^2 = 0.02$, $P = 0.23$) and PPV ($r^2 = 0.02$, $P = 0.15$), descending slope and FCD ($r^2 = 0.01$, $P = 0.96$) or PPV ($r^2 = 0.01$, $P = 0.28$), ascending slope and FCD ($r^2 = 0.03$, $P = 0.08$) and PPV ($r^2 = 0.01$, $P = 0.44$). See figure for point cloud of ascending slope and PPV for the 95 measures.



CONCLUSION. We failed to demonstrate any significant correlation between data obtained with NIRS and SDF in critically ill patients. These two techniques explore different variables in different regions of the body. Both have prognostic implications and can provide complementary information.

REFERENCE. 1. Creteur ICM 2007. 2. Sakr CCM 2004.

0794

USE OF NEAR-INFRARED SPECTROSCOPY ON FINGER DURING A VASCULAR OCCLUSION TEST TO ASSESS THE DYNAMIC TISSUE O2 SATURATION RESPONSE

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INTRODUCTION. Near-infrared spectroscopy (NIRS) in combination with a vascular occlusion test (VOT) has been proposed to assess and identify metabolic and microcirculatory alterations during sepsis and shock in critically ill patients. For the analysis of changes in the tissue O2 saturation (StO2) during a circulatory stress test, the sphygmomanometer is usually placed on the upper arm and the StO2 is measured over the thenar eminence. However, to automatize repeated measurements at the bedside, this technique can potentially cause discomfort to the patient. Vascular arterial occlusion in the finger may be a more attractive method to perform repeated measurements at the bedside because of patient tolerability.

OBJECTIVE. To investigate whether vascular occlusion performed in the finger can be used as a surrogate for vascular occlusion in the upper arm to assess the dynamic StO2 response.

METHODS. StO2 was non-invasively measured in 11 healthy volunteers during VOTs using two InSpectra Tissue Spectrometers (model 650) equipped with a 15-mm or a 10-mm probe. The 15-mm probe was placed over the thenar eminence and the 10-mm probe was place over the ventral face of the middle finger. We performed in each subject a series of three vascular occlusion tests on the finger (3, 5 and 10 min) followed by one on the arm (3 min). VOT-derived StO2 traces were analyzed for baseline, ischemic and reperfusion parameters.

RESULTS. The general results of VOT in the finger and in the arm are shown in the following table:

DYNAMIC STO2 RESPONSE DURING VOT

Measurement site	Arm	Finger	Finger	Finger
Probe	15 mm	10 mm	10 mm	10 mm
Vascular occlusion time	3 min	3 min	5 min	10 min
Baseline (%)	82 ± 3[a]	89 ± 10	91 ± 10	92 ± 17
Down-slope (% per min)	−10 ± 3	−8.5 ± 2	−8.7 ± 2.6	−8.1 ± 2
Down-slope fit (R^2)	0.98 ± 0.01	0.96 ± 0.02	0.98 ± 0.01	0.98 ± 0.01
Up-slope(% s)	4 ± 1.3[a]	1.2 ± 0.5	1.7 ± 0.9	2.3 ± 1.5[b]
Up-slope fit (R^2)	0.98 ± 0.01	0.92 ± 0.04	0.96 ± 0.02[b]	0.95 ± 0.02[b]
AUC Ischemic (% per min)	46 ± 14	32 ± 11	84 ± 41[c]	194 ± 55[c]

[a]$P < 0.05$ versus finger (3, 5, 10 min)
[b]$P < 0.05$ versus finger 3 min
[c]$P < 0.05$ versus thenar

StO2 baseline and StO2 up-slope in the finger differed significantly from the arm. No difference in the StO2 down-slope was found between arm and finger. Based on the curve fit (R^2) for both StO2 slopes, the best occlusion time in the finger to study NIRS-dynamic variables was 5 min.

CONCLUSION. Near-infrared spectroscopy can be used on finger to assess the StO2 response to vascular occlusion test. Our results showed that 5 min is an adequate occlusion time to provide the best curve fit for NIRS dynamic variables.

0795

EFFECTS OF SODIUM HYDROSULPHIDE ON HEMODYNAMICS, INFLAMMATORY RESPONSE AND OXIDATIVE STRESS DURING RETRANSFUSED HEMORRHAGIC SHOCK IN RATS

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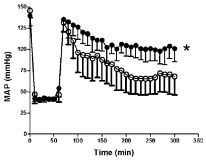
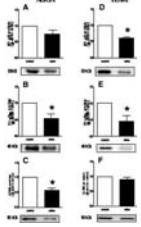
INTRODUCTION. Pre-treatment with hydrogen sulfide (H_2S), was shown to improve survival in rodent models of otherwise lethal hypoxia or hemorrhage [1]. H_2S, however, has also vasodilatory properties, and inhibition of endogenous H_2S production improved hemodynamics and thereby reduced organ injury after hemorrhagic shock. Since all these data originate from unresuscitated hemorrhage [2], we therefore tested the hypothesis that the H_2S donor sodium hydrosulfide (NaHS) would improve hemodynamics and attenuate oxidative and nitrosative stresses after controlled hemorrhage and retransfusion.

METHODS. We randomly allocated 22 rats to either intravenous bolus of NaHS or vehicle (0.9% saline). Rats were anesthetized, mechanically ventilated, and instrumented to measure heart rate, mean arterial pressure (MAP) and carotid blood flow. Animals were bled during 60 min to maintain MAP at 40 ± 2 mmHg and then, the shed blood was reinfused. The NaHS group received a bolus of 0.2 mg/kg 10 min before retransfusion and the control group received the same amount of vehicle. Hemodynamic parameters were monitored during 300 min every 10 min. Animals were then sacrificed. Blood, aorta and heart were harvested for Western blot and electron paramagnetic resonance.

RESULTS. H_2S significantly limited the decrease in MAP during reperfusion (Fig. 1).



NaHS significantly reduced the release of radical oxygen species after reperfusion. NaHS provided protective effects by significantly reducing the inflammatory response induced by reperfusion (Fig. 2).



CONCLUSIONS. The results of our study demonstrate that NaHS, a H_2S donor, is protective against ischemia reperfusion injuries induced by controlled hemorrhage in rats.

REFERENCE. 1. Morrison ML et al. (2008) J Trauma. 2. Mok YY et al. (2004) Br J Pharmacol.

0796

THENAR OXYGEN SATURATION (STO2) MEASURED NON-INVASIVELY BY NEAR-INFRARED SPECTROSCOPY DURING WEANING FROM MECHANICAL VENTILATION. PRELIMINARY RESULTS

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AIMS. To determine whether changes in tissue oxygen saturation (StO2) measured by near-infrared spectroscopy (NIRS) on the thenar eminence, and its changes derived from an ischemic challenge, can be used to predict success of weaning from mechanical ventilation.

METHODS. Prospective clinical study, performed in a 26-bed medical-surgical intensive care unit, at a university-affiliated hospital. We recruited adult patients with acute respiratory failure receiving mechanical ventilation for at least 48 h, and considered ready to wean by their physicians. Patients underwent a 30 min spontaneous breathing trial (SBT). Continuous StO2 was measured non-invasively on the thenar eminence. A transient arterial occlusion proximal to the StO2 probe was performed twice (baseline, and at minute 30 of SBT). Demographic data, StO2, gas exchange, ventilatory parameters and hemodynamic measurements were recorded just before starting the trial, and during the trial.

RESULTS. Thirty patients were studied. Main variables measured are shown in Table 1. Five patients did not succeed the SBT. Twenty-three patients succeed the SBT, and were extubated. Two of these patients needed re-institution of MV within 24 h. Patients who failed the overall weaning trial ($n = 7$) showed a significant increase in their thenar StO2 deoxygenation rate (DeOx) during the ischemic challenge at minute 30 of SBT as compared to patients who were successfully weaned (-25 ± 15 vs. -13 ± 3%/min, p 0.05). The ratio between the 30 min DeOx and the baseline DeOx (DeOx ratio) was also different between both groups of patients (1.8 ± 0.7 vs. 1.0 ± 0.3, p 0.009). The DeOx ratio showed an AUC 0.88 (p 0.01) for prediction of weaning success. A DeOx ratio cut-off value of 1.4 has a sensitivity 0.8, specificity 0.94, for predicting weaning success.

MEASUREMENTS AT BASELINE AND MINUTE 30

	Weaning success ($n = 23$)		Weaning failure ($n = 7$)	
	Baseline	Minute 30	Baseline	Minute 30
MAP (mmHg)	82 ± 9	82 ± 15	81 ± 16	89 ± 23
RR (resp/min)	18 ± 3	23 ± 6	19 ± 2	29 ± 7
Vt (mL)	471 ± 88	470 ± 132	466 ± 60	335 ± 110
pH	7.46 ± 0.06	7.45 ± 0.08	7.46 ± 0.08	7.44 ± 0.03
pCO2 (mmHg)	34 ± 5	36 ± 7	36 ± 4	39 ± 4
StO2 (%)	81 ± 5	81 ± 6	76 ± 7	75 ± 8
DeOx (% per min)	−16 ± 12	−13 ± 3	−15 ± 7	−25 ± 15*
DeOx ratio		1.04 ± 0.29		1.77 ± 0.69*

CONCLUSIONS. Weaning failure was associated with increased deoxygenation rate during an ischemic challenge after 30 min of SBT. Measurement of StO2 and its changes during transient arterial occlusion might be helpful in predicting weaning outcome.

Nosocomial infections: 0797–0801

0797

SEVEN-YEAR TRENDS IN MICROBIOLOGICAL ISOLATES AND ANTIBIOTIC RESISTANCE IN A MIXED MEDICAL-SURGICAL ITALIAN INTENSIVE CARE UNIT

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AIMS. Sepsis is common in intensive care units (ICU) and carries high morbidity and mortality. Antibiotics are widely used and can induce selection of resistant strains. Microbiology is important to guide treatment: in particular, WHO's infection surveillance guidelines recommend strict epidemiological surveillance to guide empiric treatment. Accordingly, in our institution epidemiological information on type and characteristics of germs are monitored and prospectively recorded since 1993.

METHODS. Prospective observational study in the five bed ICU of an Italian non-teaching hospital. Patients were taken specimens at ICU admission and twice weekly thereafter. Microbiology provided periodical electronic reports of isolates and antibiotic susceptibility.

RESULTS. There were 984 ICU admissions between 2002 and 2008: 60% were medical patients while 40% were surgical; 27% were suspected to be septic at admission and 15% developed sepsis during ICU stay. Median ICU length of stay was 4 days. ICU mortality was 24% and hospital mortality 27%.

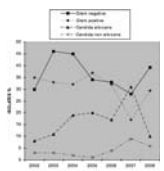

Figure 1 depicts the seven-year trend of relevant specimens. It is a known phenomenon that gram+ and gram− prevalence has a cyclic pattern. Our study is in accordance with this finding. However, this seemed to change in 2006–2007 when both gram+ and gram− isolates showed a decreasing trend, replaced by fungi.

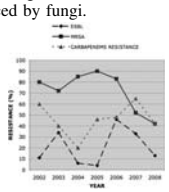

Figure 2 shows pattern of resistance to antibiotics of four common bacteria in ICU: methicillin resistant *Staphylococcus aureus* (MRSA), carbapenems resistant *Pseudomonas aeruginosa* and ESBL (extended spectrum beta-lactamases) *Escherichia coli* and *Klebsiella pneumoniae*. High level of MRSA were observed throughout the period, but in the last 2 years resistance almost halved. Lowest level of ESBL and carbapenems resistance was observed when highest was the incidence of gram− germs.

CONCLUSIONS. This study confirms other studies in EU Countries about the rise in fungi in ICU patients' isolates and the high prevalence of MRSA.

0798

IMPACT OF SHORT TERM FOCUSED EDUCATION INTERVENTION ON ICU NURSES' AWARENESS OF INFECTION CONTROL MEASURES, ICU HAND WASHING PRACTICES AND NOSOCOMIAL INFECTIONS

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INTRODUCTION. A statistically non-significant increase in nurses' awareness of infection control measures has been reported after a month of focused education [1]. Indian Intensive Care Units (ICU) have reported high acquired infection rates [2]. Education can improve infection control in ICU [3]. We evaluated baseline nurses' awareness about infection control measures and the impact of 3–4 months long focused education.

METHODS. Awareness of infection control measures amongst ICU nurses of Fortis Hospital, NOIDA, UP, India was assessed using multiple choice questions (MCQ) at baseline, after one month and 3–4 months of focused education intervention in form of lectures and bedside training. The incidence of ventilator associated pneumonia (VAP), catheter associated blood stream infection (CABSI), catheter associated urinary tract infections (CAUTI), and alcohol–chlorhexidine hand rub utilization was recorded for 3 months prior and 3 months after the initial month of the intervention. The results were statistically analyzed.

RESULTS. Mean ± SD 41.94 ± 12.23% MCQ were correctly answered by 108 nurses evaluated at baseline. After a month, 56 nurses answered 50 ± 12.86% MCQ correctly as compared to baseline of 42.68 ± 13.94% ($P = 0.0054$) in the same subset. Similarly, after 3–4 months of the intervention 64 nurses correctly responded to 50.78 ± 14.26% MCQ as compared to their baseline of 44.37 ± 12.05% ($P = 0.0058$). Only 57 nurses could be tested both at one and 3–4 months after intervention and correctly responded to 48.24 ± 12.08 and 51.92 ± 14.52% MCQ respectively ($P = 0.058$, NS). High dropout rate after initial evaluation was mainly due to nurses leaving the hospital. Mean ± SD VAP, CABSI and CAUTI (per 1,000 device days), 3 months before and 3 months after initial month of intervention, were 24.95 ± 8.16 and 12.74 ± 15.33 ($P = 0.145$); 4.63 ± 1.98 and 5.76 ± 2.43 ($P = 0.298$) and 4.05 ± 1.64 and 3.59 ± 1.58 ($P = 0.37$) respectively. An MDR Acinetobacter outbreak occurred during 2nd month of intervention, which was quickly contained within the same month. Mean ± SD hand rub utilization per patient ICU day, 3 months before and 3 months after initial month of intervention were 87.17 ± 26.14 and 141.59 ± 21.33 ml respectively ($P = 0.024$).

CONCLUSIONS. At baseline, less than half MCQ were correctly answered by the nurses. After focused education intervention, nurses' awareness significantly improved. Post-intervention there was a 48.94% decrease in mean VAP rates although this did not reach statistical significance. Acinetobacter outbreak during the second month, though rapidly contained, could have masked the improvements. Hand rub utilization significantly improved, suggesting better hand washing compliance and this may have contributed to reduction in infection rates.

REFERENCE(S). 1. Intensive Care Med 2008; 34(suppl 1):S232. 2. J Hosp Infect. 2007; 67(2):168. 3. Clin Infect Dis. 2007; 45:704.

GRANT ACKNOWLEDGEMENT. None.

0799

PREOPERATIVE RISK FACTORS ON SURGICAL WOUND INFECTION. MULTICENTRE STUDY IN 59 CATALONIAN HOSPITALS

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INTRODUCTION. Surgical wound infection is a common problem and represents an important complication of surgery. Underlying patient pathology has a clear influence on surgical wound infection occurrence.

OBJECTIVES. To establish surgical wound infection incidence and identify preoperative risk factors that can influence in his appearance.

METHODS. Prospective, observational, multicentre study during a period of one year (2006–2007) in 59 hospitals of Catalonia. Variables assessed: sex, age, weight (body mass index), ASA, independence grade, alcohol and smoke habit, diabetes, respiratory, cardiovascular, renal, neurological and liver pathology, type of surgery, central catheter, nasogastric tube, thoracic drainage, neoplastic disease, immunosuppression, sepsis, blood transfusion on last week. χ^2 test and T student test were analysed.

RESULTS. 2,991 patients were studied. 50.7% male and 49.3% female; elective surgery 70.7%; emergency surgery 11.8% and ambulatory major surgery 17.5%; ASA I 30%, ASA II 52.2%, ASA III 16% y ASA IV 1.8%. About them, 13.7% suffered from postoperative complications, 5% suffered from respiratory complications, 4.2% cardiovascular ones and 4.7% suffered from surgical wound infection. Next variables has been associated with a high significance risk of surgical wound infection: ASA (P 0.000), independence grade (P 0.000), acute respiratory process on last month (P 0.001), oxygenotherapy at home on last year (P 0.032), HTA (P 0.001), sever peripheral vascular pathology (P 0.027), renal failure (P 0.002), diabetes (P 0.037), sepsis (P 0.001), coagulopathy (P 0.014), cardiovascular pathology (P 0.000) and neoplastic disease on last 5 years (P 0.000).

CONCLUSIONS. Co-morbidites clearly contribute to increase incidence of surgical wound infection. It is important to identify risk patients and to emphasize the importance of good patients preparation before surgery just as being accurately in the intraoperative management in order to decrease surgical wound infection.

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0800

THE IMPACT OF AN ANTIBIOTIC POLICY CHANGE ON *CLOSTRIDIUM DIFFICILE* INFECTION IN A UK TEACHING HOSPITAL INTENSIVE CARE UNIT

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INTRODUCTION. Clostridium difficile infection (CDI) can cause diarrhoea, dehydration, pseudomembranous colitis, toxic megacolon, intestinal perforation and death. It has been shown to increase mortality and length of stay in critically ill patients. The critically ill are at particular risk of acquiring CDI. CDI is associated especially with use of third generation cephalosporins, clindamycin and prolonged use of aminopenicillins. Carbapenems have also recently been associated with CDI. Fluroquinolones may have contributed to more resistant strains. There has been an increase in CDI rates from 1990. This increase became more rapid in the late 1990s and early 2000s. Government and media focus on the problem in recent years has encouraged the development of, and adherence to, national guidelines and a resultant fall in CDI is now becoming evident in the UK. One of the Health Protection Agency's key recommendations for reducing rates of CDI is restrictive antibiotic guidelines. Antibiotic prescribing policy was changed in The University Hospital of North Staffordshire in September 2007, shifting from the predominant use of third generation cephalosporins and quinolones to aminopenicillins and aminoglycosides.

OBJECTIVES. To review whether rates of CDI were reduced in Intensive Care patients with the introduction of a restrictive antibiotic prescribing policy.

METHODS. Databases of health care associated infections (HCAI) were reviewed and the number of positive *Clostridium difficile* results were noted. Patients were excluded if they were admitted with CDI. Two time periods were compared, before and after the antibiotic prescribing policy change. During the reviewed time periods no other significant changes were implemented in regard to reducing CDI or other HCAIs.

RESULTS. In the 17 months prior to the antibiotic change 37 out of 998 patients had CD detected. In the 16 months after only 11 out of 1,134 patients had CD detected. This represents a 73.8% fall in CDI since the antibiotic policy change.

CONCLUSIONS. Several studies and a systematic review show that CDI can be reduced by restricting cephalosporins and clindamycin. Our data demonstrate a dramatic reduction in CDI in our ICU with a fundamental change in antibiotic prescribing. The fall in CDI in our unit is double the fall in CDI rates in the UK. We encourage all ICUs to take up the Health Protection Agency's recommendation for antibiotic prescribing.

REFERENCE(S). 1. Ang et al. 2008; Biller et al. 2007; Davey et al. 2006; Department of Health; Fowler et al. 2007; Goorhuis et al. 2007; Health Protection Agency; Itani et al. 2006; Kuijper et al. 2006; Lawrence et al. 2007; Loo et al. 2005; McFarland et al. 1989; National *Clostridium difficile* Standards Group 2004; Saxton et al. 2007; Settle et al. 1998; Stone et al. 2000; Thomas et al. 2003; Valiquette et al. 2007; Warny et al. 2005; Wilcox et al. 2004.

GRANT ACKNOWLEDGEMENT. N/A.

0801

HOW MANY ICU PATIENTS RECEIVE ANTIFUNGAL THERAPY? RESULTS FROM FONGIDAY: A ONE-DAY PREVALENCE STUDY IN 169 ICUS

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INTRODUCTION. Invasive Candida infection is a difficult to diagnose life threatening disease. Low sensitivity of available diagnostic tools and long delay to positivity of blood samples has lead to the development of prophylactic and preemptive treatment strategies for ICU patients.

OBJECTIVES. To assess prevalence and factors associated with systemic antifungal therapy (SAT) administration in critically ill patients.

METHODS. One day (9 December 2008 = Fongiday) cross sectional study involving 169 ICUs (53% University-hospitals, 63.7% polyvalent, 20.8% medical and 16.7% surgical, 13.7% pediatrics and neonatology). We recorded center and patient characteristics, Candida colonization and infection, as well as SAT administration at Fongiday and at day 28.

RESULTS. Among the 2047 patients, 154 (7.5%) were receiving SAT. 16 patients were treated for other fungal infection (mostly aspergillosis). In the remaining treated patients, reasons for SAT included: 27.5% proven candidiasis, 18% empiric therapy in patients with risk factors for candidemia, 17% prophylaxis, 34.8% preemptive, and 13% because of hemodynamic instability. SAT consisted in fluconazole in 40.8%, Caspofungin in 23.5%, Voriconazole in 8.5%, and liposomal amphotericin in 5.9%.

Documented Candida species included: 48% albicans, 7% glabrata, 2.6% parapsilosis, 1.3% krusei, 1.3% kefir, and 19.5% other or unknown species.

Independently of patient based risk factors for receiving SAT (emergency surgery admission, malignant hemopathy, Candida colonization, in ICU use of steroids, severe sepsis); ICU based variables associated with the use of SAT were: smaller institutions (<800beds), with organ transplant activity, higher incidence of ICU acquired candidemia and prescription habits such as high use of fluoroquinolones or fewer cost considerations in treatment decisions and local habits for preemptive and empirical therapy.

Even though patients receiving SAT were sickest (saps II 52.1 vs. 43.4; $P < 10^{-4}$), had a longer ICU stay (13 vs. 7 days; $P < 10^{-4}$), received more immunosuppressive therapy (56.5 vs. 23%; $P < 10^{-4}$) and were more frequently colonized with Candida (63.6 vs. 8.6%; $P < 10^{-4}$); outcomes were similar in both groups. Day 28 mortality was 19.5% [SAT group 20.1%; no SAT: 19.5%; HR 0.86 (0.59–1.27); $P = 0.46$].

CONCLUSIONS. SAT are prescribed in 7.5% of ICU patients, chiefly fluconazole and caspofungin. Only less than 25% of these patients have a sound SAT indication, other patients receive SAT on the basis of risk factors for candidemia, or as a preemptive indication. SAT patients are sickest and expected to die more frequently than patients without SAT, but mortality is not different, suggesting a benefit from SAT and leaving a place for further evaluation.

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Communication in the ICU: 0802–0806

0802

HOW CAN WE IMPROVE COMMUNICATION BETWEEN THE INTENSIVE CARE UNIT (ICU) AND PRIMARY CARE?

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INTRODUCTION. When a patient is admitted to the ICU it can be a distressing and confusing time. Following discharge, it is often the GP who will be faced with difficult questions regarding the admission and also with managing long-term sequelae of critical illness. Intensive communication carried out during admission can have a positive effect on outcome [1]. It is imperative for patient care that we also ensure optimum communication between healthcare professionals after discharge from ICU.

OBJECTIVES. This survey was designed to identify areas where communication could be improved between The Royal Sussex Hospital ICU and General Practitioners in the Brighton and Hove area.

METHODS. All 250 individual GPs in the Brighton and Hove Primary Care Trust were contacted via the practice managers and consulted using an online multiple-choice survey hosted by Surveymonkey. 59 GPs responded (24%).

RESULTS.

SUMMARY TABLE OF GP RESPONSES

Question	Yes (%)	No (%)	Not sure/do not mind (%)
When one of your patients is admitted to the ICU would you like to be informed by fax?	78	10	12
Would you like to receive a faxed discharge summary when the patient is discharged from ICU?	81	12	7
Would you also like to receive a discharge summary if the patient dies in addition to the information currently faxed to you by the bereavement office?	78	12	10
Would you like an update on what's new in ICU on a GP Refresher day?	44	31	25
Do your patients who have been on the ICU, or their relatives, have unanswered questions following their stay?	29	19	52
Would you like to have someone to contact in the event of any unanswered questions?	85	7	8
Do your patients who have been on ICU have continuing rehabilitation needs after discharge?	66	9	25
Do you think any of your patients would benefit from an ICU follow up clinic?	34	14	52

CONCLUSIONS. GPs were highly in favour of receiving simple communications from ICU, i.e. Faxed notification of patient admission or discharge, a faxed discharge summary if a patient dies in ICU, and a point of contact in the event of unanswered questions post-discharge. However, few GPs find their patients have unanswered questions following a stay in ICU. Although most GPs feel their patients have continuing rehabilitation needs, few feel that a follow-up clinic would be of value.

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0803

MORTALITY AS A QUALITY INDICATOR OF ICU RESULTS AND A QUALITY INDICATOR OF ORGAN PROCUREMENT PROGRAMS. IMPACT OF A MODEL OF CATEGORIZATION OF PATIENTS AT ADMISSION IN ICU

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INTRODUCTION AND OBJECTIVES. Mortality is a Quality Indicator of ICU (high mortality means bad results). Detection of brain dead patients in ICU is Quality Indicator of donation programs (high number of brain dead detected means good result of the program). The objective of this research was to analyze if the use of a Model of Categorization of Patients at admission in ICU can make compatible both antagonist Quality Indicators.

METHODS. A continuous series of 621 patients admitted in a neurological ICU were included. All patients were classified at admission in ICU in one of these categories (Catg.): Catg. 1: Critical ill patient, needing intensive care monitoring and therapeutic; no limit in the treatment. Catg. 2: Similar to Catg. 1, but no active treatment at admission, Catg. 3: like Catg. 1, excepting some level of therapeutic limit because co-morbilities, Catg. 4.: Admitted in ICU but could also be managed in the ward (too much healthy for ICU), Catg. 5: Admitted in ICU but too sick to benefit from ICU care (specific neurological criteria for Catg. 5, based on clinical and CT scan data, was performed). The influence of categorization in the number of potential donors detected, and the global results of the ICU were analyzed. A statistic analysis of proportions of brain death due to admission of Categ. 5 was performed.

RESULTS. The main group of patients of brain dead patients was Spontaneous Intracerebral Hemorrhage and Subarachnoid Hemorrhage.

MORTALITY OF PATIENTS ACCORDING CATEGORIES

	Number of patients	Dead patients	Brain dead patients
Categories 1–4	605	80	47
Categorie 5	16	16	16
Total	621	96	63

Global mortality (15.45%) compared with Mortality without Categ. 5 (13.88%): no significant statistical difference ($P = 0.26$). Brain death including all categories ($N = 63$) compared with brain death excluding Catg. 5 ($N = 47$) significant difference ($P < 0.001$).

CONCLUSIONS. The use of a Model of Categorization of Patients at admission of patients in ICU make compatible the use of Mortality as an Quality Indicator of ICU and also as a Quality Indicator in organ procurement programs. Its use helps to demonstrate the non significant increase of global mortality and relevant increase of the number of organs potential donors.

0804

DETERMINANTS OF FAMILY SATISFACTION IN THE ICU

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It has previously been demonstrated that the families of patients dying in the ICU report higher satisfaction with their ICU experience than the families of survivors. The aim of this study was to explore the determinants of family satisfaction of patients in an Australian ICU population.

A total of 108 consecutive patients, staying >48 h in a mixed, level 3 ICU were identified. Eight were excluded because next of kin contact details were unavailable. A written questionnaire was posted to next of kin 4 weeks after ICU discharge. Subjects who had not responded after 4 weeks were then contacted by phone, consent was sought, and, if given, a phone questionnaire was performed. Family satisfaction was measured using a 10 item questionnaire incorporating visual analogue scales.

Seven subjects refused to participate. 59 responded by post and a further 25 agreed to a phone interview. Thus a total of 84 family members were included, 73 of patients who survived, and 11 whose relative died in ICU. Overall family satisfaction was high (mean scores 6.8–8.1). Highest scores recorded were for communications with nursing staff (8.1 ± 2.2), lowest score for communication with medical staff (6.8 ± 2.6). Ten (12%) families had mean overall scores <5. There was no difference in the satisfaction scores between families of survivors and non-survivors.

0805

ICU RESEARCH: WHO SHOULD CONSENT?

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INTRODUCTION. Informed consent (Ic) for research in the particular context of ICU is controversial, even for conscious patients. Preferences of patients and relatives regarding its modalities were rarely investigated. We sought to explore whether they differed for patients and relatives according to the invasiveness of the study proposed or the consciousness of the patient.

METHODS. Patient and relative's pairs were randomized to express their opinion about Ic's modalities for either a non-invasive (NIS, i.e retrospective data extraction) or an invasive study (IS, i.e. prospective drug trial). Similar questions were addressed for a conscious and an unconscious patient. The questionnaire was distributed shortly after ICU discharge.

RESULTS. Of 553 eligible patients, 185 (33%) patients and 125 relatives of these patients (68%) responded. If conscious, most patients thought they were the person to be asked the Ic {NIS: 69/93(74%); IS: 64/92(70%)}. For NIS, 7 (8%) thought the physicians could consent or that no consent was necessary, and 6 (7%) that the relatives could. If unconscious, the patients would like the relatives to give Ic, differently depending on the invasiveness {NIS: 53(57%); IS: 48(52%), $P = 0.01$}. ICU doctors were more sought in NIS {10(11%) vs. 0} whereas it was the family doctors for IS {13 (14%) vs. 5 (5%)}. 9 (10%) for NIS and 8 (9%) for IS choose waiving of consent. For conscious patient, most relatives thought patients were the person to be asked the Ic {NIS: 44/64 (69%); IS: 42/61 (69%)}. They themselves came in second position {NIS: 9 (14%); IS: 8(13%)}. For unconscious patients 2/3 of relatives thought of themselves and then of ICU doctors {NIS: 9 (14%); IS: 8 (13%)}. A third of patients would like a second person to consent, and 48% if unconscious and IS. More relatives wanted a second person to give Ic for IS than for NIS: for conscious 36 (59%) versus 21 (33%) ($P = 0.0012$); for unconscious 37 (61%) versus 23(36%) ($P = 0.0068$), respectively. Rates of concordance between patients and relatives were of 64–80%. In emergency situation, less patients agreed that the study starts before the Ic for IS than for NIS: for conscious 48 (52%) versus 63 (68%) ($P = 0.04$); for unconscious 49 (54%) versus 61 (66%), respectively. 28 (46%) to 44 (69%) of relatives thought the study could start, depending on consciousness and invasiveness. Most pairs agreed to consent in two steps, independently on consciousness or invasiveness (64–75%).

CONCLUSION. ICU patients and relatives' attitudes regarding Ic for research were different according to patient's consciousness. They were more protective with unconscious patients. For conscious patients, most patients and relatives wanted the patient to consent. For unconscious patients, about half of them wanted the relatives to decide. The others would like to defer Ic to physicians (either ICU or family doctors). Invasiveness of the study impacted significantly. On the whole, up to 10% choose waiving of consent.

0806

EVALUATION OF EMOTIONAL EXPERIENCE IN ICU PATIENTS

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AIM. Psycholocigal problems are commonly encountered in critically ill patients. The aim of this study was to evaluate the emotional experience of these patients during the period when mechanical ventilation requirement ended and determine the relationship of this experience with clinical and demographic parameters.

METHOD. Patients who had undergone mechanical ventilation (invasive or noninvasive) and could be discharged from intensive care unit (ICU) were included in the study. All patients were asked to read and answer the demographic data sheet and hospital anxiety depression form. Patients who could not be able to answer these questionarries due to lack of mental capacity, cooperation or educational level and patients who had psychiatric problems were excluded. Then, anxiete and depression scores were calculated, and the relationship with clinical and demographic parameters were evaluated.

RESULTS. Twenty-two patients with a median age of 52 (23–78) were evaluated. 31.8% (*n* 7) of the patients were determined anxiete (median score: 7.27), and 45.5% (*n* 10) of the patients were determined depression (median score: 7.13). There were no significant differences between the frequency of the anxiete and depression and the demographic features, ICU days, and the duration of mechanical ventilation ($P > 0.05$).

CONCLUSION. The data of this study have pointed that ICU patients significantly have anxiete and depression. There was no relationship between the parameters and anxiete and depression, maybe because of the handicap of the case numbers. So we should increase the number of the cases and evaluate the emotional experiences of the critically ill patients in ICU.

Muscle metabolism and endocrinology: 0807–0811

0807

MECHANISMS LINKING INSULIN RESISTANCE AND MUSCLE METABOLISM IN SIRS: RESULTS OF A HUMAN OBSERVATIONAL STUDY

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INTRODUCTION. Insulin resistance is a common feature in critically ill patients. However, tissue specific mechanisms of insulin resistance are not well understood. We aimed to determine whole body insulin sensitivity and its impact on skeletal muscle metabolism in patients during early course of critical illness.

METHODS. Prospective observational study in patients with a SOFA score ≥ 8 on 3 days within 7 days after ICU admission. We determined the insulin sensitivity index (ISI) during a hyperinsulinemic-euglycemic clamp applying a continuous infusion with 100 mU/m^2 insulin. Steady state condition was defined at blood glucose levels (BGL) between 80 and 110 mg/dl with a variation of less than 10% derived from four glucose measurements within a one hour period. Tissue metabolites (glucose, lactate, pyruvate) were determined via a microdialysis catheter inserted in the vastus medial muscle. All metabolites were analyzed every 20 min at baseline (bs) and during steady state (ss) conditions of the clamp. To determine ex vivo insulin stimulated cellular glucose uptake, we incubated undifferentiated human myosarcoma RD18 cells 6 h in a medium containing 5% serum of the patients or controls. Medium was changed to glucose-free medium before being incubated with 3H-2'Deoxy-glucose for another 60 min. 3H-2'Deoxy-glucose uptake was measured in a betacounter. ISI and cellular glucose uptake have been compared to 14 healthy controls matched by BMI, age and gender. Data are given as median (25/75) percentile.

RESULTS. Hyperinsulinemic-euglycemic clamp was performed in 14 patients [multiple trauma ($n = 3$), acute respiratory failure ($n = 6$), abdominal sepsis ($n = 5$)] 4.5 (2/6) days after study enrolment. Median age was 55 (28/80), SAPS-II 58 (48.5/65) and SOFA 13.5(9.5/15.8) upon ICU admission. BGL (ss) and insulin dosage (ss) were 84.2 mg/dl (74.5/92) and 15 IU/h (14.4/15.7) respectively in ICU patients. ICU patients revealed significant ($P < 0.0001$) insulin resistance compared to controls [ISI (M-value (mg/kg/min)/Insulin (mU/ml))] = 0.02 (0.015/0.03) vs. 0.08 (0.04/0.11)]. Tissue glucose level in skeletal muscle decreased significantly ($P = 0.003$) during clamp [49 mg/dl (33.3/77.3) at bs versus 34.3 mg/dl (18.7/49.3) at ss]. Lactate, pyruvate tissue levels and lactate/pyruvate ratio in skeletal muscle tissue remained unchanged [32.5 (23.2/46.5) vs. 37.1 (23.9/44.4)] during baseline and at steady state respectively. In vitro investigation of insulin stimulated cellular glucose uptake revealed significant impairment of insulin stimulated glucose uptake in ICU patients (22 vs. 3% insulin-induced increase in controls vs. ICU patients; $P < 0.01$).

DISCUSSION. Critically ill patients show substantial whole-body insulin resistance during early SIRS. The oxidative glucose metabolism of skeletal muscle tissue in vivo, however, remains constant at that time, whereas circulating plasma mediators induce substantial impairment of insulin-stimulated glucose uptake in vitro.

0808

SELECTIVE MYOSIN LOSS IN SKELETAL MUSCLE OF CRITICALLY ILL PATIENTS

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INTRODUCTION. Critically ill patients frequently develop muscle weakness, which contributes to adverse outcome and prolonged rehabilitation. This complication may arise from a neurogenic and/or myogenic problem, but distinction between both is difficult using routine diagnostic tools. In muscle biopsies of critically ill patients, selective loss of myosin protein has been suggested to point to a myogenic component.

OBJECTIVE. We aimed to measure the myosin/actin ratio in skeletal muscle biopsies obtained from a heterogeneous group of surgical and medical intensive care unit (ICU) patients and from matched controls. We planned to study the myosin/actin ratio in relation to the presence of abnormal spontaneous electrical activity, in relation to insulin therapy and use of glucocorticoids.

METHODS. Secondary analysis of two large prospective single-center randomized clinical studies in a surgical [1] and medical [2] ICU. Patients were randomised to strict blood glucose control (80–110 mg/dl) with insulin or conventional glucose management, only starting insulin if glucose level $\geq$215 mg/dl. Biopsies were taken from the rectus abdominis and/or quadriceps muscle in critically ill patients and matched controls. Myosin/actin ratios were determined using sodium dodecyl sulphate-polyacrylamide gel electrophoresis[3].

RESULTS. The myosin/actin ratio in muscle from critically ill patients was lower than in controls. A severely reduced myosin/actin ratio (<1.5) was present in 18–32% of the patients who were biopsied, and abnormal spontaneous electrical activity on electrophysiological screening in 48–53%, whereas concomitant presence of both features was infrequent (10–12%). Intensive insulin therapy appeared moderately protective against a severely reduced myosin/actin ratio in rectus abdominis, but not vastus lateralis. Prolonged corticosteroid administration was associated with a lower vastus lateralis myosin/actin ratio.

CONCLUSIONS. A low myosin/actin ratio and spontaneous electrical activity are often present but only rarely co-occur in skeletal muscle from ICU patients, suggestive of distinct pathophysiology. Intensive insulin therapy partially protected against, whereas prolonged treatment with corticosteroids predisposed to, major selective loss of myosin in specific skeletal muscles.

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0809

INCIDENCE AND RISK FACTORS OF HYPERTRIGLYCERIDEMIA IN AN INTENSIVE CARE UNIT WITH ARTIFICIAL NUTRITION AND INTENSIVE INSULIN THERAPY

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BACKGROUND. A linear correlation between serum triglycerides and risk of intensive care mortality was identified. Various clinical and metabolic situations (such as sepsis, renal failure, hepatic failure, parenteral nutrition and administration of certain drugs) have been associated with hypertriglyceridemia (HTG). It is well known that HTG is associated with acute pancreatitis. Intensive insulin therapy (IIT) in patients requiring intensive care for more than 7 days normalizes blood glucose levels and concomitantly partially restores the abnormalities in the serum lipid profiles and HTG.

AIMS. The aim of this study was to determine the incidence of HTG in patients receiving artificial nutrition and IIT in an Intensive Care Unit (ICU), to describe their characteristics and to establish the relevance of risk factors associated with HTG.

METHODS. This is a prospective, observational, cohort study performed in a General Intensive Care Unit of Toulouse University Hospital (France) from 1st May 2007 to 31st July 2008. We included all consecutive intensive care patients with initial serum triglycerides level of less than 3 mmol/L who received at least 7 days of artificial nutrition using enteral feeding (hypercaloric hypernitrogenous with 80 g lipids (MCT) for 1,500 mL) by naso-gastric tube or parenteral feeding [2,100 total kcal, 16 g N, 250 g glucose, 75 g lipids (MCT/LCT) for 2,000 ml], with at least three biochemical serum triglyceride analysis with one week interval and IIT for tight glycemic control (6.1 mmol/L). χ^2 test and multivariate logistic regression model were performed for statistical analysis. A total of 17 clinical factors were studied as independent variables.

RESULTS. A total of 107 patients were included in the study. Administration lipid was 0.83 ± 0.36 g/(kg day) (theorical body weight). Incidence of HTG (>3 mmol/L) was calculated as 17.9% per year. Multivariate analysis identified three independent risk factors for HTG: age ($P = 0.02$; adjusted β-coefficient $= -0.04$), insulin dosage ($P = 0.01$; adjusted β-coefficient $= 0.83$) and hepatic failure (total bilirubine > 25 mmol/L) ($P = 0.04$; adjusted β-coefficient $= 1.27$).

CONCLUSION. This study shows that ICU admitted patients receiving artificial nutrition and intensive insulin therapy are prone to develop HTG. Hepatic failure and insulin infusion rate were the most important risk factors for HTG. Age had a protective effect. Our results raise three important matters: (1) serum triglycerides assessment is necessary in seriously ill patients receiving artificial nutrition; (2) elevated triglycerides reflect the degree of insulin resistance and severity of critical illness; (3) hypertriglyceridemic profile of young patients admitted in ICU is very important to be considered.

0810

VITAMIN D DEFICIENCY IS HIGHLY PREVALENT IN CRITICALLY ILL PATIENTS

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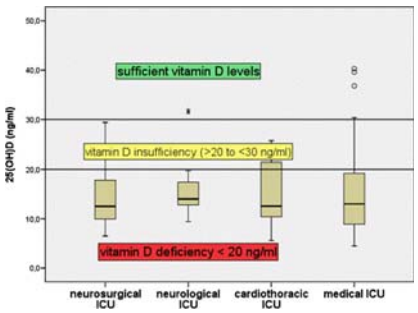
INTRODUCTION. Low vitamin D levels are associated with increased overall mortality independently of major clinical risk factors. Vitamin D insufficiency and deficiency is present in 30–50% of healthy adults. UV-B induced cutaneous synthesis is the main source of vitamin D as opposed to only small quantities originating from dietary sources. The typical daily amount of vitamin D3 given with enteral or parenteral nutrition to ICU patients who are deprived of sunlight is 200 IU and thus lies well below the recommended doses.

OBJECTIVES. Our primary objective was to evaluate the prevalence of vitamin D deficiency in critically ill patients at different intensive care units of a large tertiary care centre during winter months.

METHODS. Vitamin D status [25-hydroxyvitamin D; 25(OH)D] was assessed at different ICUs (medical, cardiothoracic, neurosurgical and neurological) in 129 patients (age 62 ± 14 years, 58% male) from September 2008 until April 2009.

RESULTS. The mean serum 25(OH)D level was 15.0 ± 7.6 ng/ml (reference range 30–60 ng/ml). 75.2% of all patients had vitamin D deficiency (<20 ng/ml), a further 20.2% vitamin D insufficiency (>20 and <30 ng/ml). Normal 25(OH)D levels (>30 ng/ml) were found in only 4.6% of all patients. There was no significant difference in 25(OH)D levels between the different ICUs (Fig. 1). Secondary hyperparathyroidism was prevalent in the medical ICU only (median parathyroid hormone level of 72.1 pg/ml).



CONCLUSIONS. Average 25(OH)D levels are markedly low in critically ill patients. Based on these results higher than current doses of vitamin D3 are recommended for supplementation. Before doing that, however, studies are needed to evaluate whether high-dose vitamin D3 supplementation can normalise 25(OH)D levels and also affect outcomes such as morbidity or mortality in an ICU setting.

0811

ADDITIONAL VALUE OF FREE CORTISOL MEASUREMENTS FOR THE ASSESSMENT OF ADRENAL FUNCTION IN CRITICALLY ILL PATIENTS?

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AIMS. Immuno-assays for serum cortisol measure the total hormone concentration (serum free cortisol plus the protein-bound fraction of cortisol). Free cortisol measurements could provide a better reflection of circulating cortisol in patients with critical illness with a decreased concentration of binding proteins. The aim of our study was to investigate the additional value of free cortisol measurements in assessing adrenal function in the critically ill.

METHODS. A prospective study was performed in a tertiary medico-surgical intensive care unit from December 2004 to March 2007, including 112 critically ill patients with a strong clinical suspicion of critical illness-related corticosteroid insufficiency (CIRCI). After measurement of baseline serum total cortisol, free cortisol (equilibrium dialysis) and corticosteroid binding globulin (CBG), all patients underwent a conventional 250 µg ACTH test. Post-stimulus total and free cortisol levels were determined at 30 and 60 min after the administration of synthetic ACTH. The Coolens method was used for calculating serum free cortisol concentrations.

RESULTS. Calculated free cortisol closely related to measured free cortisol at baseline ($r = 0.948$) as well as for stimulated free cortisol increments ($r = 0.77$). Serum free cortisol correlated well with serum total cortisol concentrations at baseline ($r = 0.79$, $P < 0.01$), at 30 ($r = 0.78$, $P < 0.01$) and 60 min ($r = 0.78$, $P < 0.01$) and for stimulated cortisol increments ($r = 0.78$, $P < 0.01$). There was no difference in total cortisol concentrations in patients with low CBG (CBG $\leq$ 25 mg/L) and patients with higher CBG levels (CBG > 25 mg/L). On the other hand, in patients with low CBG levels free cortisol at baseline, and 30 and 60 min after the ACTH-test were higher than those in normal CBG group ($P < 0.01$ at all time-points). However, the increment upon ACTH of free cortisol was not affected by low CBG. There was no difference in total and free cortisol concentration at baseline in patients with low albumin levels (<2.5 g/dl or <1.7 g/dl). Nor did low albumin affect the increment of free cortisol.

CONCLUSIONS. In assessing adrenal function in the critically ill, measurement of free cortisol can be reliably estimated using the Coolens method. However, free cortisol has no additional value over total cortisol for diagnosing CIRCI, when considering the delta-cortisol as a major criterium. As expected, patients with low CBG had higher free cortisol concentrations for a given total cortisol. However, the response to the ACTH test was not affected by low binding proteins, in fact total cortisol increments closely paralleled free cortisol increments.

Neuro/emergency medicine 3: 0812–0816

0812

INFLAMMATORY PARAMETERS IN HYPOTHERMIC PATIENTS DURING POST-CARDIAC ARREST SYNDROME

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INTRODUCTION. The prognosis of patients after return of spontaneous circulation after cardiac arrest is mainly determined by the primary brain injury. Following global ischemia, a number of cellular and molecular reactions initiate a cascade of events, resulting in neuronal injury and death. The mechanisms leading to secondary neurological damage are complex with multiple modulators, signaling pathways, enzymes, and proteins that may facilitate cell death or survival. Cytokines play a critical role in cerebral ischemic injury, exhibiting both neurotoxic and neuroprotective effects. The receptor for advanced glycation end products (RAGE) is a member of the Ig superfamily of cell surface receptors and is present in the brain on neurons, glia and endothelial cells. Both RAGE and its ligand high mobility group box 1 (HMGB1) play a role as mediators of ischemic inflammation and neurodegeneration. The aim of our study was to study mediators of the systemic and cerebral inflammatory response in patients treated with mild hypothermia after cardiac arrest.

METHODS. A prospective study was performed in ten comatose patients after cardiac arrest. All patients were treated with mild hypothermia (32–34°C) for 24 h, followed by passive rewarming to normothermia. IL-1b, IL-6, IL-8, TNF-a and HMGB1 levels were measured at repeated intervals in arterial and jugular bulb blood samples. Results are expressed as median (interquartile range). Changes in cytokine levels over time were analyzed with one-way analysis of variance. Differences between groups were analyzed with two-way analysis of variance. A $P < 0.05$ was considered statistically significant.

RESULTS. IL-6 concentrations were low during hypothermia in both arterial and jugular bulb samples [48 (28–66) and 50 (36–70) pg/ml], and increased during rewarming to 211 (153–407) and 211 (145–381) pg/ml respectively at 24 h ($P < 0.001$).The systemic concentration of IL-8 decreased during admission from 35 (31–55) to 16 (15–18) pg/ml ($P < 0.001$). In the jugular bulb samples IL-8 decreased from 42 (27–65) to 18 (14–23) pg/ml ($P < 0.001$). HMGB-1 concentration on admission was increased in both arterial and jugular bulb samples 1.98 (0.31–3.14) and 2.52 (0.27–2.92) ng/ml respectively. Levels decreased over the next 48 h. TNF and IL-1b were below detection limits. There were no significant differences in IL-6, IL-8 and HMGB-1 levels between arterial and jugular bulb samples at any time point.

CONCLUSIONS. IL-6, IL-8 and HMGB-1 concentrations are increased after cardiac arrest. We found no significant differences in IL-6, IL-8 and HMGB-1 concentrations between arterial and jugular bulb samples suggesting a systemic inflammatory response as a contributing factor to the post-cardiac arrest syndrome rather than an isolated cerebral inflammatory response.

0813

NEUROLOGICAL OUTCOMES WITH EARLY OUT-OF-HOSPITAL INTRAVENOUS ADRENALINE ADMINISTRATION BY EMERGENCY TECHNICIANS IN THE MANAGEMENT OF CARDIOPULMONARY ARREST

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INTRODUCTION. Although adrenaline is still a potentially useful drug for the patients with cardiopulmonary arrest (CPA), it is still unclear whether the administration of adrenaline during an early phase after CPA onset contributes to neurologically good outcomes or not. We seek to investigate the benefit of the early administration of intravenous adrenaline on the neurological outcomes of out-of-hospital CPA patients by authorized emergency medical technicians (A-EMTs). In Japan, only A-EMTs are allowed to give intravenous adrenaline in out-of-hospital CPA setting, while standard EMTs (S-EMTs) are not allowed. There are no technical differences between the two types of EMTs except the procedure of intravenous adrenaline administration.

METHODS. We experienced 348 sudden onset CPAs in patients more than 8 years old between April 2006 and March 2008. Cardiopulmonary resuscitation (CPR) in accordance with 2005 American Heart Association guideline was performed in all patients. We compared demographics, ECG patterns at the scene, and Glasgow Outcome Categories (GOC) one month after admission between patients that were given intravenous adrenaline at out-of-hospital situation (OH group) and patients given intravenous adrenaline after arrival at a hospital (AH group). There had more than one A-EMTs in the ambulances of OH group and only S-EMTs in AH group. Comparisons between the two groups were made with Student t test or χ^2 test. Good GOC was defined as GOC 1 or 2.

RESULTS. Of the total patients, 63 patients (18.1%) were in OH group. Adrenaline was given at 22.3 ± 7.6 min after the patients' collapse in OH group, which was 10 min earlier than in AH group ($P < 0.05$). There were no differences in age, cardiac causes, witnesses, bystander CPR, ventricular fibrillation or pulseless ventricular tachycardia on the initial ECG and survival in one month between the groups. Out-of-hospital return of spontaneous circulation was higher (30.2 vs. 12.6% respectively, $P < 0.05$) and good GOC was lower (0 vs. 6.7%, respectively, $P < 0.05$) in OH group than AH group.

CONCLUSION. This study indicates that early adrenaline injection contribute to out-of-hospital return of spontaneous circulation, but not to neurological recovery. Additional investigations are needed for the trial of the drugs such as anti-diuretic hormone alone or in combination with adrenaline.

0814

RAPID HYPOTHERMIA INDUCTION AFTER CARDIAC ARREST SHORTENS ICU AND HOSPITAL STAY

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INTRODUCTION. Optimal timing for the induction of therapeutic hypothermia (TH) after cardiac arrest (CA) is still not definite. We wanted to determine a correlation between time to target temperature (TTT) and outcome or length of stay (LOS) in these patients.

METHODS. We enrolled 73 consecutive patients admitted to the 18 bed mixed ICU in a teaching hospital. Most patients ($n = 43$) have been secondarily addressed by primary care centres for percutaneous cardiac intervention (PCI) after CA. TTT was defined from return of spontaneous circulation to a core temperature of 33°C. Patients were assigned to three arbitrarily defined groups, according to their TTT, to study the influence of this time factor on the LOS and outcome: fast (F) < 180 min; medium (M) 181–300 min; slow (S) > 300 min. Cerebral performance score (CPC) was used for outcome measurement at the end of the hospital stay.

RESULTS. Although there is no difference in outcome between the groups, LOS in the ICU as well as in the hospital is significantly longer in the S-group compared to the F-group (Table 1). Mean time from CA to hospital admission differed significantly for patients secondarily referred to our hospital versus those directly admitted to our hospital where optimal temperature management started (106 ± 53 vs. 59 ± 43 min, $P = 0.0001$). Statistical analysis used Student's t test, ANOVA and chi square tests.

COMPARISON OF OUTCOME AND LOS

Group	Fast ($n = 28$)	Medium ($n = 24$)	Slow ($n = 21$)	
Mean time to target temperature (min ± SD)	134 ± 44*	240 ± 33*	427 ± 136*	*Intergroup ANOVA $P < 0.05$
Good outcome (CPC1-2)	43%	45%	43%	NS
Bad outcome (CPC 3-4)	11%	13%	10%	NS
Dead (CPC 5)	46%	42%	47%	NS
ICU-stay (days)	9.4*	14.1	17.4*	*Intergroup ANOVA $P < 0.05$
Hospital stay (days)	17*	20	31*	*Intergroup ANOVA $P < 0.05$

CONCLUSION. Shorter TTT decrease LOS in ICU and hospital with a potential financial impact, even without outcome improvement. If longer transportation times are encountered prehospital cooling after CA should be promoted.

0815

CARDIAC ARREST IN FRANCE: SO COOL INTENSIVE CARE UNITS

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INTRODUCTION. According to French and international guidelines, mild therapeutic hypothermia (MTH) is indicated in unconscious adult patients with spontaneous circulation after out-of-hospital ventricular fibrillation cardiac arrest. Several surveys investigated the implementation of MTH into clinical practice in ICU's in several countries but not in France yet.

METHODS. Based on the Directory of the Société de Réanimation de Langue Française (French society of Intensive Care Medecine: SRLF) a senior doctor of each medical ICU was contacted by telephone and was asked to take part in the survey concerning practice of MTH after cardiac arrest in his unit.

RESULTS. 208 ICU (58 in Universitary Hospitals, 128 in General Hospitals and 22 in Private Hospitals) accepted to take part in the survey, 13 could not be contacted despite repeated phone calls, three refused to take part in the survey. 75% of ICU implemented MTH, 70% according to a protocol inspired from SRLF or ILCOR guidelines. 62% of ICUs managed less than 20 cardiac arrest per year and 4% more than 50 cardiac arrest per year. Concerning out-of-hospital cardiac arrest, MTH is consistently performed in 87% of ventricular fibrillation or tachycardia and in 69% of pulseless electrical activity or asystole. MTH was performed consistently in 60% of in-hospital cardiac arrest. The most employed methods for MTH was the conventional method (ice packs, wet linen, ventilator) (68%), intravascular cooling devices (13%) and water cooling blankets (8%). The satisfaction rates were respectively 47, 86 and 58%. 41% used cold fluid infusion for induction of MTH. The core temperature goal was 32–34°C in 90%, monitored by rectal (29%), bladder (24%), or oesophageal probe (22%), intravascular device (17%) or external device (8%). Rewarming was passive in 79% of ICU after 12 h (6%) or 24 h (75%) of MTH.

MTH was not implemented in 25% of ICUs because of lack of experience (51%), technical difficulties (35%), or lack of convincing studies (20%).

In multivariate analysis, implementation of MTH was significantly associated with the presence of a written protocol concerning cardiac arrest management in the unit, teaching hospital status and more than 11 bed ICU ($P < 0.05$).

CONCLUSION. In contrast with previous North American and other European surveys, MTH after cardiac arrest seems to be well implemented in France. The conventional method of cooling is the most used but other methods seem to offer more satisfaction. A larger diffusion of guidelines would probably improve implementation of MTH in cardiac arrest.

0816

SEDATION, ANALGESIA AND NEUROMUSCULAR BLOCKADE PROTOCOL DURING THERAPEUTIC HYPOTERMIA. IT IS TIME FOR A CONSENSUS

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AIM. Present practice guidelines recommend sedative-analgesic and neuromuscular blocker (NMB) administration during therapeutic hypothermia in comatose patients after cardiac arrest. However none of them suggest the possible best administration protocol. Inadequate use of sedative and NMB agents prolongs recovery, delays time to reliable evaluation of neurological status and prognosis and could increase complications. Also, paralytic agent administration, without EEG monitoring, prevents seizure activity detection. The aim of this study is to evaluate the different protocols used in published reports.
METHODS. A systematic literature review was conducted based on a MEDILINE/PubMed search to identify all clinical studies published between January 1997–April 2009, with the search terms: "therapeutic hypothermia" (TH) and "cardiac arrest". Selected articles had to meet the following criteria to be included: TH use for improving neurologic outcome in coma patients following cardiac arrest and specific mention of the sedative-analgesic and neuromuscular blockade protocol used during this treatment procedure. We checked the type of drug and employed dose, the administration proposal, the specific neurologic and neuromuscular monitoring used and the complications detected.
RESULTS. We identified 35 studies, including 1,443 patients, which represent the protocol used in 51 ICUs from different countries; 33 from 14 European countries; 9 from USA; 5 from Australia; 2 from Japan; and 1 from Israel. In 9 ICUs there was no information about the specific type of sedative used. In the rest midazolam was the most frequently used sedative; in 34 ICUs; at doses between 5 mg/h and 0.3 mg/(kg h) and in 14 ICUs the midazolam dose was not specificied. Propofol was used in 6 ICUs at doses up to 4 mg/(kg h); loracepam was used in 1 ICU and ketamine in the other one. Sixteen ICUs (31%) did not use any analgesic during hypothermia and in four the type of analgesic was not specificied. Fentanyl was used in 25 ICUs at doses between 0.5–10 μg/(kg h); morphine was employed in 3 and buprenorphine, sufentanil and piritramide in the other. NMBs were routinely used to avoid shivering in 38 ICUs and to treat shivering in 8; in 4 the objective of its use was not specificied and in 1 ICU its use was discouraged. Pancuronium was used in 20 ICUs, vecuronium in 8, cisatracurium in 7, rocuronium in 5, atracurium in 3 and in 7 the NMB employed was not specificied. Only 2 ICUs used continuous monitoring of cerebral activity during the hypothermia procedure, one with EEG, and in other one using the bispectral index. Two ICUs used neuromuscular blocker administration guided by TOF monitoring.
CONCLUSION. There is a great variability in the protocols used. Very often the sedative and the dose chosen do not seem the most appropriate for this procedure. Only two ICUs routinely use EEG monitoring during paralysis. It is necessary to reach a consensus on this specific critical care population.

Information from wide sample observational studies: 0817–0821

0817

ANNUAL VOLUME OF MECHANICAL VENTILATION CONTRIBUTES TO OUTCOME'S VARIABILITY AMONG INSTITUTIONS

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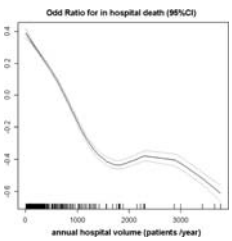
INTRODUCTION. An increased volume of patients is associated with improved survival in numerous high-risk medical conditions. Relationship between the number of patients admitted (hospital volume) and outcome among patients requiring mechanical ventilation gave discordant results [1, 2]. Our objective was to evaluate this relationship in a large population of patients.
METHODS. Prospective multicenter cohort study performed on the PMSI database. This database provide diagnosis related groups (DRG) for all stays by inpatients in public or private hospitals in France. All patients aged 18 or older who were admitted in the ICU in 2004 and 2005, and requiring conventional mechanical ventilation. Institutions with less than 100 admissions per year were not included in this study. Patients requiring only non invasive ventilation were excluded from this study. Multivariate hierarchical mixed regression model was used to adjust for confounders and for effect of clustering with institutions.
RESULTS. 179,197 patients receiving mechanical ventilation in 294 hospitals in 2004 and 2005 were included in this study. The median annual hospital volume was 162 patients (interquartile range 99 to 282). Overall hospital mortality was of 31.4% ranging from 40.8% in the lowest annual volume quartile (<99 patients) to 28.2% in the highest annual volume quartile (>282 patients) (Fig. 1).



After adjustment for the severity of illness (SAPSII score), age, diagnosis related group, and organ failure, an increase in hospital volume was associated with a significant reduction in hospital mortality [OR: 0.9985 for each additional 10 patients treated (95% CI: 0.9978–0.9992); $P = 0.0001$]. The multivariate mixed regression model identified persistence of a significant centre effect after adjustments on volume effect ($P < 0.0001$).
In predefined subgroups, the annual number of patients requiring mechanical ventilation for specific diseases, but not overall hospital volume, was significantly associated with hospital mortality.

CONCLUSIONS. Annual volume of patients receiving mechanical ventilation is associated with increased survival. Persistence of significant differences in outcomes among centers after adjustment on annual volume confirms that other determinants of centre effect are relevant and also deserve further research.

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0818

VOLUME-OUTCOME RELATIONSHIP FOR RENAL REPLACEMENT THERAPY IN THE ICU

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INTRODUCTION. Evidence suggests that patients requiring high risk procedures benefit from care at institutions that provide a large volume of these procedures. A volume–outcome relationship is known for mechanical ventilation in the ICU, yet no one has examined this relationship for renal replacement therapy (RRT). We examined this relationship in a large Parisian ICU database, hypothesizing that mortality would decrease as annual RRT volume increased.

METHODS. We conducted an observational retrospective cohort study using CUB-REA, a database of 40 ICUs in and around Paris, France. We selected all non-surgical adult patients requiring RRT admitted to either a medical or combined medical-surgical ICU. We assessed the association of annual RRT volume with ICU and hospital mortality using multivariable modeling accounting for clustering and adjusting for age, co-morbidities, admitting diagnosis, SAPS-II, pre-ICU length of stay (LOS), location before ICU admission, and hospital and ICU characteristics.

RESULTS. In our cohort, 9,449 patients received RRT. Median [interquartile range (IQR)] age was 62 (49–73) years, SAPS II was 52 (40–71) and ICU and hospital LOS were 6 (2–14) and 13 (5–28) days. The number of RRT cases per ICU per year varied considerably, from 3 to 128 (quartile1 = 3–17, quartile2 = 18–29, quartile3 = 29–58, quartile4 = 59–129). Of all cases, 7.8% occurred in ICUs providing RRT less than 17 times per year. Mode of RRT most commonly was intermittent (69%). The majority of RRT patients required mechanical ventilation (62%) or vasopressors (62%). Less than 1/3 (28%) of patients had pre-admission renal dysfunction. Overall ICU and hospital mortality were 45 and 49%, and did not vary by quartile of annual RRT volume (lowest to highest volume, ICU mortality: 51.6, 45.1, 44.3, 44.2%; hospital mortality: 54.0, 48.5, 47.8, 48.6%). After adjusting for patient and hospital characteristics, there was no association between annual RRT volume and either ICU or hospital mortality whether we treated volume as a continuous measure or as quartiles.

CONCLUSION. In this preliminary analysis, though there were massive variations in annual RRT volume per ICU, we were unable to demonstrate a volume–outcome relationship. One possible explanation is that high RRT volume does not equate with expert provision of RRT. Alternatively, the range of volume seen in CUB-REA, even on the low end, may have been sufficient to provide ongoing RRT competency. Further analyses are planned to understand reasons for our negative findings and to determine if other forms of organ support demonstrate volume-outcome relationships in CUB-REA.

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0819

CRITICAL CARE AND THE ELDERLY: THE UK EXPERIENCE

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INTRODUCTION. With national and international estimates indicating a marked increase in elderly people over the coming decades and with a tendency towards more aggressive health care for this age group, demand for critical care services is likely to increase. Significant gaps exist in our knowledge about the role of critical care in the elderly population [1], which may expose older patients to age-based biases [2]. With the UK Government publishing guidance aimed at improving all care for older patients [3], we investigated what could be learned from current provision of critical care to elderly patients to inform future planning.
METHODS. Data for 633,429 admissions to 188 adult, general critical care units in England, Wales and Northern Ireland from January 1996 to December 2007 were extracted from the Case Mix Programme Database. Admissions were grouped by age: 16–64, 65–74, 75–84 and 85+ years. First, trends in numbers of elderly critical care admissions were compared with population figures and second, case mix, outcome and length of stay were compared for 153,803 recent admissions (2006/2007).
RESULTS. Elderly admissions, aged 75+ years, increased markedly from 1996/1997 to 2006/2007. The per capita increase was greater for those aged 75–84 and 85+ compared with those aged 16–64 and 65–74 years. Using recent data (2006/2007), admissions aged 75+ years accounted for just over one quarter of admissions, had similar severity to younger admissions but were more likely to be admitted following emergency surgery (see Table 1). Older patients had higher unit mortality, were more likely to die in the hospital following discharge from critical care and were less likely to return to their normal residence. However, overall, elderly admissions consumed similar critical care resources to younger admissions.

CASE MIX, OUTCOME AND LENGTH OF STAY BY AGE GROUP

Age group	16–64 ($N = 77,061$)	65–74 ($N = 35,912$)	75–84 ($N = 32,042$)	85 + ($N = 7,042$)
Admissions (%)	50.7	23.6	21.1	4.6
ICNARC physiology score (mean)	17.1	18.7	19.6	19.3
Admission post emergency surgery (%)	16.9	17.9	22.7	31.4
Death in critical care unit[a] (%)	14.2	20.6	25.1	26.5
Post critical care unit in-hospital death[a] (%)	4.3	9.0	13.0	18.9
Return to normal residence[a] (%)	63.8	58.3	48.7	40.1
Critical care unit LOS, days (median)	2.0	2.2	2.1	1.8

[a]Excluding readmissions within the same acute hospital stay

CONCLUSIONS. Elderly admissions to UK critical care units are increasing. Information on current provision of critical care, case mix and outcomes, could stimulate debate about future provision.

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0820

LIVER CIRRHOSIS AND INTENSIVE CARE, UNHAPPY BEDFELLOWS? AN ANALYSIS OF ADMISSIONS TO ICU WITH CIRRHOSIS OVER A 12 YEAR PERIOD FROM THE INTENSIVE CARE NATIONAL AUDIT & RESEARCH CENTRE (ICNARC) DATABASE

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INTRODUCTION. Patients with liver cirrhosis admitted to intensive care (ICU) have a poor prognosis. However, these studies are from single centres, that often provide transplantation [1]. We thus examined general ITU admissions with liver disease over 10-year period in units contributing to ICNARC.

METHODS. Data was obtained for all adult patients considered to have cirrhosis (excluding transplant) as a reason for admission or past medical history (PMH) from 626,953 admissions to 192 general ICUs in England, Wales and Northern Ireland—1 December 1995–30 June 2008. More in depth data of sepsis (see [2] for definition), respiratory and renal support was also obtained from 64,063 admissions to 87 ICUs 1 May 2003–29 April 2005 (Table 2) and 75 ICUs 15 April 2006–29 June 2008 (Table 3).

RESULTS. Cirrhosis accounted for 2.6% of admissions with a high hospital mortality >55% (Table 1). The incidence of sepsis in patients with PMH of cirrhosis was high (28%). Further analysis confirmed the high mortality of sepsis + organ failure (up to 90%) compared to sepsis alone (50–65%) and without sepsis (25–39%) (Tables 2, 3).

OVERVIEW

	Liver disease as primary/secondary reason for admission	Past medical history of liver disease
Number of admissions (% of total)	11,333 (1.8%)	4,763 (0.8%)
Age (years), mean (SD)	52.2 (13.1)	55.6 (14.3)
Sex (male), *n* (%)	7,036 (62.1)	2,825 (59.3)
APACHE II score, mean (SD)	19.0 (8.1)	22.0 (8.4)
Lowest mean arterial pressure (mmHg), mean (SD)	62.3 (15.3)	62.0 (15.6)
Severe sepsis in first 24 h of admission, *n*(%)	1,133 (10.0)	1,343 (28.2)
Critical care unit mortality, *n* (%); Ultimate acute hospital mortality, *n* (%)	4,640 (40.9); 6,136 (57.4)	1,835 (38.5); 2,350 (55.4)
Critical care unit length of stay (days), median (IQR) {non-survivors-ns} {survivors-s}	2.2 (0.9 - 5.8); {ns - 2.0(0.7 -5.9)}, {s - 2.3 (1.0 - 5.7)}	2.6 (1.0 - 6.6); {ns - 2.2 (0.8 - 6.1)}, {s - 2.8 (1.1 - 6.8)}
Total acute hospital length of stay(days), median (IQR){non-survivors-ns} {survivors-s}	12 (5 - 25); {ns - 8 (3 - 17)}, {s - 19 (10 - 36)}	15 (7 - 31); {ns - 10 (3 - 21)}, {s - 23 (13 - 44)}

[Overview]

Cirrhosis group	Combination in 1st 24 h (S-severe sepsis; V-mechanical ventilation; R-renal replacement therapy)	N of all admissions from specific treatment analysis (%)	Critical care unit mortality, *n* (%)	Acute hospital mortality*, *n* (%)
Liver disease as primary or secondary reason for admission	None (i.e. no episode of sepsis, ventilation or renalreplacement)	344 (28.0)	62 (18.0)	128 (39.1)
	V	616 (50.2)	276 (44.8)	355 (61.1)
	SV	89 (7.3)	50 (56.2)	55 (67.1)
	VR	117 (9.5)	88 (75.2)	91 (83.5)
	SVR	29 (2.4)	21 (72.4)	25 (92.6)
Liver disease as past medical history	None	121 (22.2)	15 (12.4)	37 (33.6)
	S	30 (5.5)	6 (20.0)	12 (52.2)
	SV	79 (14.5)	45 (57.0)	48 (71.6)
	VR	80 (14.7)	54 (67.5)	60 (87.0)

[Outcome of sepsis +/- organ failure (i)]

Cirrhosis group	Combination in 1st 24 h (S-severe sepsis; V-mechanical ventilation; R-renal replacement therapy)	N of all admissions from specific treatment analysis (%)	Critical care unit mortality, *n* (%)	Acute hospital mortality, *n* (%)
Liver disease as a primary or secondary reason for admission	None (i.e. no episode of sepsis, ventilation or renal replacement)	217 (32.7)	26 (12.0)	51 (24.3)
	V	306 (46.1)	129 (42.2)	162 (57.2)
	SV	42 (6.3)	24 (57.1)	27 (65.9)
	VR	63 (9.5)	49 (77.8)	56 (90.3)
Liver disease as past medical history	None	97 (29.0)	14 (14.4)	33 (37.9)
	S	25 (7.5)	7 (28.0)	12 (66.7)
	V	112 (33.4)	37 (33.0)	53 (53.0)
	SV	52 (15.5)	21 (40.4)	30 (62.5)
	VR	27 (8.1)	16 (59.3)	15 (60.0)

CONCLUSIONS. This is the largest study of ICU admissions with cirrhosis and confirms high mortality and incidence of sepsis. Given the poor outcome, physicians must attempt to prevent and treat sepsis in cirrhosis quickly and aggressively.

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0821

MULTICENTRE DATA NEEDED TO COMPARE NATIONAL SURVEILLANCE SYSTEMS AND FORMULATE POLICY RECOMMENDATIONS ON ICU-ACQUIRED PNEUMONIA

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INTRODUCTION. ICU nosocomial infections (NI) mortality exceeds three times that of hospitals. NI frequency is determined by clinical practices, hospital hygiene strategies, human resources, and surveillance activities. The related policies can be oriented by comparing similar "NI systems". By standardising definitions and indicators, the HELICS project enabled the comparison of routine data from the Belgian (NSIH-ICU) and French (REA-SE) networks.

OBJECTIVES. We aimed at identifying the needed data to advise NI control policies.

METHODS. A qualitative analysis of common indicators and a comparison of relevant determinants and outputs of the 2006 French and Belgian reports on ICU-acquired pneumonia (PN) were performed to identify the missing relevant data.

RESULTS. Some PN indicators and determinants (antibiotics at admission, length of stay, and frequency of intubation) were available as well as potential confounders (age, gender, SAPS II score and patients' origin). Only patients staying more than 2 days in the ICU were included. Table 1 provides the main determinants and output indicators in both networks. In France, the most frequent PN micro-organisms were S. aureus, P. aeruginosa, E. coli and H. influenzae and in Belgium, P. aeruginosa, C. albicans, S. aureus and E. coli. MRSA represents 35.9% of all S. aureus (32.4% in Belgium). The most important but unrecorded data, hampering comparative studies was the ICU PN case fatality rates. Data on average length of AB treatment; hospital hygiene staff; national campaigns and ICU staff training would be useful but were also missing.

CONCLUSIONS. Surveillance networks should consider operational control issues while selecting the indicators to be collected. Data comparison revealed differences in PN microbiological diagnosis technique which can bias frequency indicators. If PN detection is less specific but more sensitive in Belgium, over-reporting cannot be discarded. Further standardisation regarding diagnosis techniques is required. Different clinical practices may explain longer stay in outliers French ICUs (higher mean but not median LOS), higher intubation rate, use of antibiotics at admission, and NI risk. The related mortality excess in French ICUs cannot be studied using routine data. Increased collaboration between epidemiologists, microbiologists and clinicians is necessary in (inter)national surveillance efforts.

DESCRIPTION OF 2006 SURVEILLANCE DATA

	France (Rea-SE)	Belgium (NSIH-ICU)
ICUs and (patients)	65 (17980)	26 (6125)
Mean age	61.2	66.2
Mean Lenght of stay (median)	11.1 (6)	7.8 (5)
Median SAPS II score	37	32
Antibiotics at admission (%)	50.3	44.4
Mean intubation days	10.5	3.3
Use of quantitative culture from minimally contaminated specimen (%)	85.2	13.4
PN/1000 intubation days	16.9	13.7
Overall ICU mortality	17.2	7.3